

## **1.3.1 Syllabus addressing the issues of Ethics, Gender Equality and Sustainability**

### **1. Ethics:**

#### **(a) Practical Ethics**

Environmental ethics, Feminism, Euthanasia.(8+8+8)

#### **Reading References:**

##### **Books:**

1.Peter Singer: Environmental ethics

##### **Link:**

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=PHI&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=PHI&syll=0&curr=1&hons=1&prog=0&degree=124#)

#### **(b) Issues in Indian Economy**

WTO and India

Different rounds of trade negotiations  
Macroeconomic Policies and Their Impact  
Fiscal Policy; trade and investment policy; financial and monetary policies; inflation and measures to control inflation, labour laws and regulation, SEZ Policies and Performance in Agriculture

Growth; productivity; agrarian structure and technology; capital formation; trade; food security and food policy, pricing and procurement; globalization and Indian agriculture.  
Policies and Performance in Industry

Growth; productivity; diversification; small scale industries; public sector; competition policy; foreign investment, globalization and Indian industry. Trends and Performance in Services

Formal and Informal Sectors, banking and insurance; trade in services.

#### **Reading References:**

- Shankar Acharya, 2010, —Macroeconomic Performance and Policies 2000-8,|| in Shankar Acharya and Rakesh Mohan, editors, India's Economy: Performances and Challenges: Development and Participation, Oxford University Press.
  - ▶ Rakesh Mohan, 2010, —India's Financial Sector and Monetary Policy Reforms in Shankar Acharya and Rakesh Mohan, editors, India's Economy: Performances and Challenges: Development and Participation, Oxford University Press.
  - ▶ PulapreBalakrishnan, Ramesh Golait and Pankaj Kumar, 2008, —Agricultural Growth in India Since 1991, RBI DEAP Study no. 27.
  - ▶ B.N. Goldar and S.C. Aggarwal, 2005, —Trade Liberalisation and Price-Cost Margin in Indian Industries, The Developing Economics, September.

- ▶ P. Goldberg, A. Khandelwal, N. Pavcnik and P. Topalova, 2009, —Trade Liberalisation and New Imported Inputs, American Economic Review, Papers and Proceedings, May.
- ▶ Kunal Sen, 2010, —Trade, Foreign Direct Investment and Industrial Transformation in India, in Premachandra Athukorala, editor, The Rise of Asia, Routledge.
- ▶ A. Ahsan, C. Pages and T. Roy, 2008, —Legislation, Enforcement and Adjudication in Indian Labour Markets: Origins, Consequences and the Way Forward, in D. Mazumdar and S. Sarkar, editors, Globalization, Labour Markets and Inequality in India, Routledge
- ▶ Dipak Mazumdar and Sandeep Sarkar, 2009, —The Employment Problem in India and the Phenomenon of the Missing Middle, Indian Journal of Labour Economics.
- ▶ J. Dennis Rajakumar, 2011, —Size and Growth of Private Corporate Sector in Indian Manufacturing, Economic and Political Weekly, April.
- ▶ Ramesh Chand, 2010, —Understanding the Nature and Causes of Food Inflation, Economic and Political Weekly, February.
- ▶ Bishwanath Goldar, 2011, —Organised Manufacturing Employment: Continuing the Debate, Economic and Political Weekly, April.
- ▶ Kaushik Basu and A. Maertens, eds, 2013, The New Oxford Companion to Economics in India, Oxford University Press
- ▶ A. Raychaudhury and P. De, International Trade in Services in India: Implications for Growth and Inequality in a Globalizing World, OUP, 2012
- ▶ India Development Reports, IGIDR

**Link:**

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#)

**(c) Economics of Health & Education**

Role of Health and Education in Human Development

Importance in poverty alleviation; health and education outcomes and their relationship with macroeconomic performance. Microeconomic Foundations of Health Economics  
Demand for health; uncertainty and health insurance market; alternative insurance mechanisms; market failure and rationale for public intervention; equity and inequality.

Evaluation of Health Programs

Costing, cost effectiveness and cost-benefit analysis; burden of disease. Health Sector in India: An Overview

Health outcomes; health systems; health financing. Education: Investment in Human Capital  
Rate of return to education: private and social; quality of education; signaling or human capital; theories of discrimination; gender and caste discrimination in India. Education Sector in India: An Overview

Literacy rates, school participation, school quality measures.

**Reading References:**

- William, Jack, Principles of Health Economics for Developing Countries, World Bank Institute Development Studies, 1999.
- World Development Report, Investing in Health, The World Bank, 1993.
- Ronald G., Ehrenberg and Robert S., Smith, Modern Labor Economics: Theory and Public Policy, Addison Wesley, 2005

**Link:**

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#)

**(d) Development Economics**

**Meaning of Economic Development 30L**

Income Approach and Capability Approach,  
Construction and interpretation of HDI;  
International variations in development measures;  
Comparing development trajectories across nations and within them.  
Dependency school of development.

**Economic Growth 30L**

An overview and policy implications of one sector growth models  
Harrod- Domar, and Solow;  
Sources of economic growth,  
International comparisons.

**Poverty and Inequality 30L**

Inequality axioms;  
A comparison of commonly used inequality measures;  
Gender Inequality,  
Connections between inequality and development;  
Poverty measurement,  
HPI;  
Poverty traps and path dependence of growth processes.

**Political Institutions and the State 30L**

Definition of institutions,  
Evolution of Political and Economic Institutions;  
The determinants of democracy;  
Alternative institutional trajectories and their relationship with economic performance;  
Within-country differences in the functioning of state institutions;  
State ownership and regulation;  
Government failures and corruption.

**TOTAL 120L**

**Reading References:**

- Jean Dreze and AmartyaSen, 2013. An Uncertain Glory: India and its Contradictions, Princeton University Press.
- Jean Dreze and AmartyaSen: Economic Development and social opportunity, OUP
- Sukhomoy Chakraborty: Development Planning: The Indian Experience, OUP

- Uma Kapila: Indian Economy since independence, Academic Foundation
- Ahluwalia and Little (ed): India's Economic Reforms and Development, OUP
- Joshi and Little: India's Economic Reforms, OUP
- Pulapre Balakrishnan, 2007, the Recovery of India: Economic Growth in the Nehru Era, Economic and Political Weekly, November.
- Rakesh Mohan, 2008, —Growth Record of Indian Economy: 1950-2008. A Story of Sustained Savings and Investment, Economic and Political Weekly, May.
- S.L. Shetty, 2007, —India's Savings Performance since the Advent of Planning, in
- K.L. Krishna and A. Vaidyanathan, editors, Institutions and Markets in India's Development.
- Himanshu, 2010, Towards New Poverty Lines for India, Economic and Political Weekly, January.
- Jean Dreze and Angus Deaton, 2009, Food and Nutrition in India: Facts and Interpretations, Economic and Political Weekly, February.
- Himanshu. 2011, —Employment Trends in India: A Re-examination, Economic and Political Weekly, September.
- Rama Baru et al, 2010, —Inequities in Access to Health Services in India: Caste, Class and Region, Economic and Political Weekly, September.
- Geeta G. Kingdon, 2007, —The Progress of School Education in India, Oxford Review of Economic Policy
- J.B.G. Tilak, 2007, —Post Elementary Education, Poverty and Development in India, International Journal of Educational Development.
- T. Dyson, 2008, —India's Demographic Transition and its Consequences for Development|| in Uma Kapila, editor, Indian Economy Since Independence, 19th edition, Academic Foundation.
- KaushikBasu, 2009, —China and India: Idiosyncratic Paths to High Growth, Economic and Political Weekly, September.
- K. James, 2008, —Glorifying Malthus: Current Debate on Demographic Dividend in India|| Economic and Political Weekly, June.
- Reetika Khera, 2011, —India's Public Distribution System: Utilisation and Impact Journal of Development Studies.
- Aniruddha Krishna and DevendraBajpai, 2011, —Lineal Spread and Radial Dissipation: Experiencing Growth in Rural India, 1992-2005, Economic and Political Weekly, September.
- KaushikBasu and A. Maertens, Eds, 2013, The New Oxford Companion to Economics, Oxford University Press.

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#)

## 2. Gender Equality/Gender Issues:

### (a) Indian Social Institutions and Polity भारतीय सामाजिकप्रतिष्ठानं राजनीतिश्च

- Section 'A' **To be answered** (MCQ – 3 X 1 = 3, Very Short Answer – 1 X 2 = 2, Other – 1 X 5 = 5)
- Indian Social Institutions: Nature and Concepts:
- Indian Social Institutions : Definition and Scope: Sociological Definition of Social Institutions. Trends of Social Changes, Sources of Indian Social Institutions (Vedic Literature, Sūtra Literature, Purāṇas, Rāmāyaṇa , Mahābhārata ,Dharmaśāstras, Buddhist and Jain Literature, Literary Works, Inscriptions, Memoirs of Foreign Writers) Social Institutions and Dharmaśāstra Literature: Dharmaśāstra as a special branch of studies of Social Institutions, sources of Dharma (Manusmṛti, 2,12; Yājñavalkyasmṛti,1.7). Different kinds of Dharma in the sense of Social Ethics Manusmṛti, 10,63; Viṣṇupurāṇa 2.16-17); Six kinds of Dharma in the sense of Duties (Mitākṣarāṭīkā on Yājñavalkyasmṛti,1.1). Tenfold Dharma as Ethical Qualities (Manusmṛti,6.92); Fourteen-Dharmasthānas (Yājñavalkyasmṛti,1.3)
- Section 'B' **To be answered** (MCQ – 3 X 1 = 3, Very Short Answer – 1 X 2 = 2, Other – 1 X 5 = 5)
- Structure of Society and Value of Life
- Varṇa-System and Caste System : Four-fold division of Varṇa System, (Ṛgveda, 10.90.12), Mahābhārata, Śāntiparva,72.3-8); Division of Varṇa according to Guṇa and Karma (Bhagavadgīta , 4.13, 18.41-44). Origin of Caste-System from Inter-caste Marriages (Mahābhārata, Anuśāsanaparva, 48.3-11); Emergence of non-Aryan tribes in Varṇa-System (Mahābhārata, Śāntiparva, 65.13-22). Social rules for up-gradation and down-gradation of Caste System (Āpastambadharmasūtra, 2.5.11.10-11, Baudhāyanadharmasūtra, 1.8.16.13-14, Manusmṛti, 10,64, Yājñavalkyasmṛti, 1.96) Position of Women in the Society : Brief survey of position of women in different stages of Society. Position of women in Mahābhārata (Anuśāsanaparva, 46.5-11, Sabhāparva, 69.4-13. Praise of women in The Bṛhatsaṃhitā of Varāhamihira (Strīprasamsā, chapter-74.1-10) Social Values of Life : Social Relevance of Indian life style with special reference to Sixteen Saṃskāras. Four aims of life 'Puruṣārtha Catuṣṭaya'- 1. Dharma, 2. Artha, 3. Kāma, 4. Mokṣa. Four Āśramas- 1. Brahmacharya, 2. Gṛhastha, 3. Vānaprastha, 4. Saṃnyās
- Section 'C' **To be answered** (MCQ – 6 X 1 = 6, Very Short Answer – 2 X 2 = 4, Other – 2 X 5 = 10)
- Indian Polity: Origin and Development
- Initial stage of Indian Polity (from Vedic period to Buddhist period). Election of King by the people: 'Viśas' in Vedic period(Ṛgveda,10.173;10.174;Atharvaveda,3.4.2; 6.87.1-2). Parliamentary Institutions:'Sabhā,'Samiti' and 'Vidatha' in Vedic period (Atharvaveda,7.12.1;12.1.6 ; Ṛgveda ,10.85.26); King-maker 'Rājakartāraḥ' Council in Atharvaveda(3.5.6-7),Council of 'Ratnis' in śatapathabrāhmaṇa(5.2.5.1); Coronation Ceremony of Samrāṭ in śatapathabrāhmaṇa (51.1.8-13; 9.4.1.1-5) Republic States in the Buddhist Period (Digghnikāya, Mahāparinibbāṇa Sutta, Aṅguttaranikāya,1.213;4.252,256) Later Stages of Indian Polity (From Kauṭilya to Mahatma Gandhi). Concept of Welfare State in Arthaśāstra of Kauṭilya

(Arthaśāstra, 1.13 : 'matsyanyāyābhithuḥ' to 'yo' asmāngopāyatīti'); Essential Qualities of King (Arthaśāstra, 6.1.16-18: 'sampādayatyasampannaḥ' to 'jayatyeva na hīyate'); State Politics 'Rajadharma' (Mahābhārata, Śāntiparva, 120.1-15; Manusmṛti, 7.1-15; Śukranīti, 1.1-15); Constituent Elements of Jain Polity in Nitivākyāmṛta of Somadeva Suri, (Daṇḍanīti- samuddeśa, 9.1.18 and Janapada-samuddeśa, 19.1.10). Relevance of Gandhian Thought in Modern Period with special reference to 'Satyāgraha' Philosophy ('Satyāgrahagītā' of Panditā Kṣamārāva and 'Gandhi Gītā', 5.1-25 of Prof. Indra)

- Section 'D' **To be answered** (MCQ – 3 X 1 = 3, Very Short Answer – 1 X 2 = 2, Other – 1 X 5 = 5)

- Cardinal Theories and Thinkers of Indian Polity
- Cardinal Theories of Indian Polity: 'Saptāṅga' Theory of State: 1. Svāmi, 2. Amātya, 3. Janapada 4. Pura, 5. Kośa, 6. Daṇḍa and 7. Mitra (Arthaśāstra, 6.1. Mahābhārata, Śāntiparva, 56.5, Śukranīti, 1.61-62). 'Maṇḍala' Theory of Inter-State Relations: 1. Ari, 2. Mitra, 3. Ari-mitra, 4. Mitra-mitra, 5. Ari-mitramitra; 'Śāḍgunya' Policy of War and Peace : 1. Sandhi, 2. Vighraha, 3. Yāna, 4. Āsana, 5. Samśraya 6. Dvaidhibhāva. 'Caturvidha Upāya' for Balancing the power of State : 1. Sāma 2. Dāma, 3. Daṇḍa, 4. Bheda; Three Types of State Power 'Śakti': 1. Prabhu śakti, 2. Mantra-śakti, 3. Utsāha-śakti. Important Thinkers on Indian Polity: Manu, Kautilya, Kāmandaka, Śukrācārya, Somadeva Suri, Mahatma Gandhi.

•

#### • **Reading References:**

- 1. Āpastambadharmasūtra - (Trans.), Bühler, George, The Sacred Laws of the Āryas, SBE Vol. 2, Part 1, 1879
- 2. Arthaśāstra of Kautilya - (Ed.) Kangale, R.P. Delhi, Motilal Banarasidas 1965
- 3. Atharvavedasāṁhitā - (Trans.) R.T.H. Griffith, Banaras, 1896-97, rept. (2 Vols) 1968.
- 4. Baudhāyanadharmasūtra - (Ed.) Umesha Chandra Pandey, Chowkhamba Sanskrit Series Office, Varanasi, 1972.
- 5. Mahābhārata (7 Vols) - (Eng. Tr.) H.P. Shastri, London, 1952-59.
- 6. Manu's Code of Law - (Ed. & Trans.) Olivelle, P. (A Critical Edition and Translation of the Manava- Dharmasāstra), OUP, New Delhi, 2006.
- 7. Rāmāyaṇa of Vālmīki — (Eng. Tr.) H.P. Shastri, London, 1952-59. (3 Vols)
- 8. Ṛgvedasāṁhitā (6 Vols) - (Eng. Tr.) H.H. Wilson, Bangalore Printing & Publishing Co., Bangalore, 1946.
- 9. Śatapathabrāhmaṇa - (with Eng. trans. ed.) Jeet Ram Bhatt, Eastern (3 Vols), BookLinkers, Delhi, 2009.
- 10. Viṣṇupurāṇa - (Eng. Tr.) H.H. Wilson, Punthi Pustak, reprint, Calcutta, 1961.
- 11. Yājñavalkyasmṛti with Mitākṣarā commentary - Chowkhamba Sanskrit Series Office, Varanasi, 1967
- 12. अंगुत्तरनिकाय (1—4 भाग) क्वच बनारसक्च 1980।
- 13. आपस्तम्बधर्मसूत्र—हरदत्त की टीकासहित, चौखम्बा संस्कृतसीरीज, वाराणसी।
- 14. कौटिलीय अर्थशास्त्र— हिन्दी अनुवाद—उदयवीर शास्त्री, मेहरचन्द लछमनदास, दिल्ली, 1968।
- 15. नीतिवाक्यामृतम्—सोमदेवसूरि विरचित, व्यांरामचन्द्र मालवीय, चौखम्बा विद्याभवन, वाराणसी, 1972।

- 16. बौधायन धर्मसूत्र—आनन्दाश्रम संस्कृत सीरीज, पूना।
- 17. बृहत्संहिता—वराहमिहिर विरचित, हिन्दी अनुवाद—बलदेवप्रसाद मिश्र, खेमराज श्रीकृष्णदास प्रकाशन, मुम्बई।
- 18. महाभारत (1—6 भाग)— हिन्दी अनुवादसहित, (अनु०) रामनारायण दत्त शास्त्री पाण्डेय, गीताप्रेस, गोरखपुर।
- 19. मनुस्मृति (1—13 भाग) — (सम्पा० एवं व्या०) उर्मिला रस्तोगी, जे.पी. पब्लिशिंग हाउस, दिल्ली, 2005
- 20. विष्णुपुराण—हिन्दी अनुवादसहित, (अनु०) मुनिलाल गुप्ता, गीताप्रेस, गोरखपुर।
- 21. शतपथब्राह्मण (1—5 भाग)—(माध्यन्दिनीय शाखा) —सायणाचार्य एवं हरिस्वामी टीका सहित, दिल्ली, 1987.
- 22. शुक्रनीति— हिन्दी अनुवाद, ब्रह्माशंकर मिश्र, चौखम्बा संस्कृतसीरीज, वाराणसी, 1968।
- 23. श्रीमद्वाल्मीकि रामायण — हिन्दी अनुवादसहित, (सम्पा०) जानकीनाथ शर्मा, (1 —2 भाग) गीताप्रेस, गोरखपुर।
- 24. कपूर, अनूपचन्द्र—राजनीतिविज्ञान के सिद्धान्त, प्रीमियर पब्लिशिंग हाउस, दिल्ली, 1967।
- 25. काणे, पी. वी. — धर्म शास्त्र का इतिहास (1—4 भाग), अनु

**Link:**

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=SNS&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=SNS&syll=0&curr=1&hons=1&prog=0&degree=124#)

**(b) Women's Writing**

1. Emily Dickinson: 'I cannot live with you',

'Because I could not stop for death'. [3+3 class hours]

Sylvia Plath: 'Lady Lazarus' [3 class hours]

Eunice De Souza: 'Advice to Women', 'Bequest' [3+3 class hours]

2. Harriet Beecher Stowe: *Uncle Tom's Cabin* [18 class hours]

3. Katherine Mansfield: 'Honeymoon' [7 class hours]

Jhumpa Lahiri: 'Interpreter of Maladies' [7 class hours]

Mahashweta Devi: 'The Hunt', tr. GayatriChakravortySpivak (Seagull, 2002) [7 class hours]

4. Virginia Woolf: 'Shakespeare's Sisters', Profession for Woman'. [6+5 class hours]

Rassundari Debi: Excerpts from *Amar Jiban* in Susie Tharu and K. Lalita, eds. *Women's writing in India*, vol. 1 (New Delhi: OUP, 1989) pp. 191–2. [5 class hours]

## Reading References:

1. Virginia Woolf: *A Room of One's Own* (New York: Harcourt, 1957) chaps. 1 and 6.
2. Simone de Beauvoir: 'Introduction', in *The Second Sex*, tr. Constance Borde and Shiela Malovany-Chevallier (London: Vintage, 2010) pp. 3–18.
3. Kumkum Sangari and Sudesh Vaid, eds., 'Introduction', in *Recasting Women: Essays in Colonial History* (New Delhi: Kali for Women, 1989) pp. 1–25.
4. Chandra Talapade Mohanty: 'Under Western Eyes: Feminist Scholarship and Colonial Discourses', in *Contemporary Postcolonial Theory: A Reader*, ed. Padmini Mongia (New York: Arnold, 1996) pp. 172–97.
5. Harriet Beecher Stowe's *Uncle Tom's Cabin* ed. Aloka Patel (Orient Blackswan)

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ENG&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ENG&syll=0&curr=1&hons=1&prog=0&degree=124#)

## 3. Environmental Sustainability:

### (a) Green Chemistry

#### Introduction to Green Chemistry (5L)

What is Green Chemistry? Need for Green Chemistry. Goals of Green Chemistry . Limitations/ Obstacles in the pursuit of the goals of Green Chemistry

#### Principles of Green Chemistry and Designing a Chemical synthesis (25L)

Twelve principles of Green Chemistry with their explanations and examples and special emphasis on the following:

1. Designing a Green Synthesis using these principles; Prevention of Waste/ byproducts; maximum incorporation of the materials used in the process into the final products , Atom Economy, calculation of atom economy of the rearrangement, addition, substitution and elimination reactions.

2. Prevention/ minimization of hazardous/ toxic products reducing toxicity.

risk = (function) hazard × exposure; waste or pollution prevention hierarchy.



3. Green solvents– supercritical fluids, water as a solvent for organic reactions, ionic liquids, fluorous biphasic solvent, PEG, solventless processes, immobilized solvents and how to compare greenness of solvents.
4. Energy requirements for reactions – alternative sources of energy: use of microwaves and ultrasonic energy.
5. Selection of starting materials; avoidance of unnecessary derivatization – careful use of blocking/protecting groups.
6. Use of catalytic reagents (wherever possible) in preference to stoichiometric reagents; catalysis and green chemistry, comparison of heterogeneous and homogeneous catalysis, biocatalysis, asymmetric catalysis and photocatalysis.
7. Prevention of chemical accidents designing greener processes, inherent safer design, principle of ISD “What you don’t have cannot harm you”, greener alternative to Bhopal Gas Tragedy (safer route to carbaryl) and Flixborough accident (safer route to cyclohexanol) subdivision of ISD, minimization, simplification, substitution, moderation and limitation.
8. Strengthening/ development of analytical techniques to prevent and minimize the generation of hazardous substances in chemical processes.

### **Examples of Green Synthesis/ Reactions and some real world cases (22L)**

1. Green Synthesis of the following compounds: adipic acid, catechol, disodium iminodiacetate (alternative to Strecker synthesis)
2. Microwave assisted reactions in water: Hofmann Elimination, methyl benzoate to benzoic acid, oxidation of toluene and alcohols; microwave assisted reactions in organic solvents Diels-Alder reaction and Decarboxylation reaction
3. Ultrasound assisted reactions: sonochemical Simmons-Smith Reaction (Ultrasonic alternative to Iodine)
4. Surfactants for carbon dioxide – replacing smog producing and ozone depleting solvents with CO<sub>2</sub> for precision cleaning and dry cleaning of garments.
5. Designing of Environmentally safe marine antifoulant.
6. Rightfit pigment: synthetic azopigments to replace toxic organic and inorganic pigments.
7. An efficient, green synthesis of a compostable and widely applicable plastic (poly lactic acid) made from corn.

8. Healthier Fats and oil by Green Chemistry: Enzymatic Inter esterification for production of no Trans-Fats and Oils

9. Development of Fully Recyclable Carpet: Cradle to Cradle Carpeting

### **Future Trends in Green Chemistry (8L)**

Oxidation reagents and catalysts; Biomimetic, multifunctional reagents; Combinatorial green chemistry; Proliferation of solventless reactions; co crystal controlled solid state synthesis (C2S3); Green chemistry in sustainable development.

### **Practical**

#### **Safer starting materials**

1. Preparation and characterization of nanoparticles of gold using tea leaves.

#### **Using renewable resources**

1. Preparation of biodiesel from vegetable/ waste cooking oil.

#### **Avoiding waste**

Principle of atom economy.

1. Use of molecular model kit to stimulate the reaction to investigate how the atom economy can illustrate Green Chemistry.

2. Preparation of propene by two methods can be studied

a. Triethylamine ion + OH<sup>-</sup> → propene + trimethylpropene + water

H<sub>2</sub>SO<sub>4</sub>/heat

b. I-propanol → Propene + water

3. Other types of reactions, like addition, elimination, substitution and rearrangement should also be studied for the calculation of atom economy.

#### **Use of enzymes as catalysts**

Benzoin condensation using Thiamine Hydrochloride as a catalyst instead of cyanide.

#### **Alternative Green solvents**

Extraction of D-limonene from orange peel using liquid CO<sub>2</sub> prepared from dry ice.  
Mechanochemical solvent free synthesis of azomethines

### **Alternative sources of energy**

1. Solvent free, microwave assisted one pot synthesis of phthalocyanine complex of copper (II).
2. Photoreduction of benzophenone to benzopinacol in the presence of sunlight.

### **Reading References:**

#### ***Theory***

- ▶ Anastas, P.T. & Warner, J.K.: Green Chemistry - Theory and Practical, Oxford University Press (1998).
- ▶ Matlack, A.S. Introduction to Green Chemistry, Marcel Dekker (2001).
- ▶ Cann, M.C. & Connely, M.E. Real-World cases in Green Chemistry, American Chemical Society, Washington (2000).
- ▶ Ryan, M.A. & Tinnensand, M. Introduction to Green Chemistry, American Chemical Society, Washington (2002).
- ▶ Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, 2nd Edition, 2010.

#### ***Practical***

- ▶ Anastas, P.T & Warner, J.C. Green Chemistry: Theory and Practice, Oxford University Press (1998).
- ▶ Kirchoff, M. & Ryan, M.A. Greener approaches to undergraduate chemistry experiment. American Chemical Society, Washington DC (2002).
- ▶ Ryan, M.A. Introduction to Green Chemistry, Tinnensand; (Ed), American Chemical Society, Washington DC (2002).
- ▶ Sharma, R.K.; Sidhwani, I.T. & Chaudhari, M.K. I.K. Green Chemistry Experiment: A monograph International Publishing House Pvt Ltd. New Delhi. Bangalore CISBN 978-93-81141-55-7 (2013).
- ▶ Cann, M.C. & Connelly, M. E. Real world cases in Green Chemistry, American Chemical Society (2008).

- ▶ Cann, M. C. & Thomas, P. Real world cases in Green Chemistry, American Chemical Society (2008).
- ▶ Lancaster, M. Green Chemistry: An Introductory Text RSC Publishing, 2nd Edition, 2010.
- ▶ Pavia, D.L., Lampman, G.M., Kriz, G.S. & Engel, R.G. Introduction to Organic Laboratory Techniques: A Microscale and Macro Scale Approach, W.B.Saunders, 1995.

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=CEM&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=CEM&syll=0&curr=1&hons=1&prog=0&degree=124#)

## **(b) CC 11 – Environmental Geography**

### **Unit 1: Environmental Issues in Geography**

1. Geographers' approach to environmental studies
2. Perception of environment in different stages of civilization
3. Concept of holistic environment and system approach
4. Ecosystem: Concept, structure and functions
5. Environmental pollution and degradation: Land, water and air
6. Space–time hierarchy of environmental problems: Local, regional and global
7. Urban environmental issues with special reference to waste management
8. Environmental programmes and policies – Global, national and local levels

### **Reading References:**

- Chandna R. C., 2002: Environmental Geography, Kalyani, Ludhiana.
- Cunningham W. P. and Cunningham M. A., 2004: Principals of Environmental Science: Inquiry and Applications, Tata Macgraw Hill, New Delhi.
- Goudie A., 2001: The Nature of the Environment, Blackwell, Oxford.
- Singh, R.B. (Eds.) (2009) Biogeography and Biodiversity. Rawat Publication, Jaipur
- Miller G. T., 2004: Environmental Science: Working with the Earth, Thomson Brooks Cole, Singapore.
- MoEF, 2006: National Environmental Policy-2006, Ministry of Environment and Forests, Government of India.
- Singh, R.B. and Hietala, R. (Eds.) (2014) Livelihood security in Northwestern Himalaya: Case studies from changing socio-economic environments in Himachal Pradesh, India. Advances in Geographical and Environmental Studies, Springer
- Odum, E. P. et al, 2005: Fundamentals of Ecology, Ceneage Learning India.
- Singh S., 1997: Environmental Geography, Prayag Pustak Bhawan. Allahabad.
- UNEP, 2007: Global Environment Outlook: GEO4: Environment For Development, United Nations Environment Programme.
- Singh, M., Singh, R.B. and Hassan, M.I. (Eds.) (2014) Climate change and biodiversity: Proceedings of IGU Rohtak Conference, Volume 1. Advances in Geographical and Environmental Studies, Springer

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=GEO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=GEO&syll=0&curr=1&hons=1&prog=0&degree=124#)

## **(c) Core T2 – Perspectives in Ecology**

### **Unit 1: Introduction to Ecology**

History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.

### **Unit 2: Population**

Unitary and Modular populations

Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion.

Geometric, exponential and logistic growth, equation and patterns, r and K strategies  
Population regulation - density-dependent and independent factors

Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.

### **Unit 3: Community**

Community characteristics: species diversity, abundance, , dominance, richness, Vertical stratification, Ecotone and edge effect. Ecological succession with one example

### **Unit 4: Ecosystem**

Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies

### **Unit 5: Applied Ecology**

Wildlife Conservation (in-situ and ex-situ conservation).

Management strategies for tiger conservation; Wild life protection act (1972)

### **List of Practical**

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Wiener diversity index for the same community

3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO<sub>2</sub>
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary/Sea coast

### Reading References:

Krebs, C. J. (2001). Ecology. VI Edition. Benjamin Cummings.

- Odum, E.P., (2008). Fundamentals of Ecology. Indian Edition. Brooks/Cole
- ▶ Robert Leo Smith Ecology and field biology Harper and Row publisher
- ▶ Ecology: Theories & Application (2001). 4th Edition by Peter Stilling.
- ▶ Ecology by Cain, Bowman & Hacker. 3rd edition. Sinauer associates

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ZOO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ZOO&syll=0&curr=1&hons=1&prog=0&degree=124#)

## (d) Wild Life Conservation and Management

### Unit 1: Introduction to Wild Life

Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.

### Unit 2: Evaluation and management of wild life

Habitat analysis, Physical parameters: Topography, Geology, Soil and water Biological Parameters: food, cover, forage, browse and cover estimation Standard evaluation procedures: remote sensing and GIS.

### Unit 3: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity

Restoration of degraded habitats

### Unit 4: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.

### Unit 5: Aims and objectives of wildlife conservation

Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation

### Unit 6: Management planning of wild life in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbation.

#### **Unit 7: Man and Wildlife**

Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population

#### **Unit 8: Protected areas**

National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

#### **List of Practical**

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, Global Positioning System, Various types of Cameras and lenses)
3. Familiarization and study of animal evidences in the field; Identification of animals through pug marks, hoof marks, scats, pellet groups, nest, antlers, etc.
4. Demonstration of different field techniques for flora and fauna
5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

#### **Reading References:**

Caughley, G., and Sinclair, A.R.E. (1994). Wildlife Ecology and Management. Blackwell Science.

► Woodroffe R., Thirgood, S. and Rabinowitz, A. (2005). People and Wildlife, Conflict or Co-existence? Cambridge University.

► Bookhout, T.A. (1996). Research and Management Techniques for Wildlife and Habitats, 5 th edition. The Wildlife Society, Allen Press.

► Sutherland, W.J. (2000). The Conservation Handbook: Research, Management and Policy.

Blackwell Sciences

► Hunter M.L., Gibbs, J.B. and Sterling, E.J. (2008). Problem-Solving in Conservation Biology and Wildlife Management: Exercises for Class, Field, and Laboratory. Blackwell Publishing.

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ZOO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ZOO&syll=0&curr=1&hons=1&prog=0&degree=124#)

## **(e) Environmental Economics**

Introduction

What is environmental economics; review of microeconomics and welfare economics. The Theory of Externalities

Pareto optimality and market failure in the presence of externalities; property rights and the Coase theorem. The Design and Implementation of Environmental Policy

Overview; Pigouvian taxes and effluent fees; tradable permits; choice between taxes and quotas under uncertainty; implementation of environmental policy. International

Environmental Problems

Trans-boundary environmental problems; economics of climate change; trade and environment. Measuring the Benefits of Environmental Improvements

Non-Market values and measurement methods; risk assessment and perception.

Sustainable Development

Concepts; measurement.

### **Reading References:**

Charles Kolstad, Intermediate Environmental Economics, Oxford University Press, 2nd edition, 2010.

► Robert N. Stavins (ed.), Economics of the Environment: Selected Readings, W.W. Norton, 5th edition, 2005.

► Roger Perman, Yue Ma, James McGilvray and Michael Common, Natural Resource and Environmental Economics, Pearson Education/Addison Wesley, 3rd edition, 2003.

► Maureen L. Cropper and Wallace E. Oates, 1992, —Environmental Economics: A Survey Journal of Economic Literature, Volume 30:675-740

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=ECO&syll=0&curr=1&hons=1&prog=0&degree=124#)

## **(f) Environmental Awareness in Sanskrit literature आयुर्वेदस्य सामान्यपरिचयः**

### **Section 'A' Environmental Issues and Importance of Sanskrit Literature :**

Science of Environment : Definition, Scope and Modern Crises : Role of Environment in human civilization; Meaning and definitions of The Environment; Various name for Science of Environment: 'Ecology', 'Paryavarana', 'Prakriti Vijnana'; Main components of Environment: living organisms (Jaiva Jagat) and non-living materials (Bhoutika Padarth). Elementary factor of Environment Physical elements, Biological elements and Cultural elements. Modern Challenges and Crises of Environment : Global warming, Climate change, Ozone depletion, Explosively increase in Pollution, Decrease in underground water level, River pollution, Deforestation in large scale. Natural calamities such as flood, draft and



earthquakes Environmental Background of Sanskrit Literature : Importance of Sanskrit Literature from the view point of Science of environment ; Concept of ' Mother Earth' and worship of Rivers in Vedic literature; Brief survey of 06 environmental issues such as protection and preservation of mother nature, planting trees in forests, and water preservation techniques as propounded in the Sanskrit Literature. Buddhist and Jain concepts of ecology, protection of trees, love for animals and birds;

### **Section 'B' Environment Awareness in Vedic Literature :**

Environmental Issues and Eco-system in Vedic Literature Divinity to Nature, Co-ordination between all natural powers of universe; Cosmic order 'Rta' as the guiding force for environment of whole universe (Rgveda, 10.85.1 ); Equivalent words for Environment in Atharvaveda : 'Vritavrita' (12.1.52 ), 'Abhivarah,'(1.32.4.), 'Avritah' (10.1.30), 'Parivrita'' (10.8.31); five basic elements of universe covered by environment : Earth, Water, Light, Air, and Ether. (Aitareya Upanishad 3.3) ; Three constituent elements of environment known as 'Chandansi': Jala (water),Vayu (air), and Osadhi (plants) (Atharvaveda, 18.1.17); Natural sources of water in five forms: rain water(Divyah),natural spring(Sravanti), wells and canals (Khanitrimah), lakes (Svayamjah) and rivers(Samudrarthah) Rigveda, 7.49.2). Environment Preservation in Vedic Literature: Five elementary sources of environment preservation: Parvat(mountain), Soma (water),Vayu (air), Parjanya (rain) and Agni (fire) (Atharvaveda, 3.21.10); Environment Protection from Sun (Rgveda,1.191.1-16,Atharvaveda,2.32.1-6, Yajurveda,4.4,10.6); Congenial atmosphere for the life created by the Union of herbs and plants with sun rays (Atharvaveda,5.28.5);Vedic concept of Ozone-layer Mahat ulb'(Rgveda,10.51.1; Atharvaveda,4.2.8); Importance of plants and animals for preservation of global ecosystem; (Yajurveda ,13.37); Eco friendly environmental organism in Upanishads (Bhadaranyaka Upanishad,3.9.28,Taittiriya Upanishad,5.101, Iso-Upanishad,1.1).

### **Section 'C' Environment Awareness in Classical Sanskrit Literature :**

Environmental Awareness and Tree plantation : Planting of Trees in Puranas as a pious activity ( Matsya Purana ,59.159;153.512 ; Varaha Purana 172. 39),Various medicinal trees to be planted in forest by king (Sukraniti,4.58-62) Plantation of new trees and preservation of old trees as royal duty of king ( Arthasastra, 2.1..20); Punishments for destroying trees and plants (Arthasastra,3.19), Plantation of trees for recharging under ground water(Brhatsamhita, 54.119). Environmental Awareness and Water management : Various types of water canals & 'Kulya' for irrigation : canal originated from river 'Nadimatr mukha kulya', canal originated from nearby mountain 'Parvataparsva vartini kulya', canal originated from pond,'Hrdasrta kulya', Preservation of water resources 'Vapi –kupa –tadaka' (Agnipuranas,209-2;V.Ramayana,2.80.10-11); Water Harvesting system in Arthasastra (2.1.20-21);Underground Water Hydrology in Brhatsamhita (Dakargaiadhyaya,chapter54); 06 Credits Unit: III Universal Environmental Issues in Literature of Kalidasa : Eight elements of Environment and concept of 'Astamurti' Siva (Abhijnasakuntalam1.); Preservation of forest,water resources, natural resources; protection of animals, birds and plant in Kalidasa's works, Environmental awareness in Abhijnasakuntalam Drama, Eco- system of Indian monsoon in Meghdoot, Seasonal weather conditions of Indian sub continent in

Rtusamhara, Himalayan ecology in Kumarasambhava, Oceanography in Raghuvamsa (canto-13).

### Reading References:

1. Arthashastra of Kautilya—(ed.) Kangale, R.P. Delhi, Motilal Banarasidas 1965
2. Atharvaveda samhita.(2 Vols — (Trans.) R.T.H. Griffith, Banaras 1968.
3. Ramayana of Valmiki (3 Vols)— (Eng. Tr.) H.P. Shastri, London, 1952-59.
4. Rgveda samhita (6 Vols)— (Eng. Tr.) H.H. Wilson, Bangalore, 1946.
5. कौरटलीय अथाशास्त्र — णहन्दी अनुवाद — उदयवीर शास्त्री, मेहरचन्द्र लछमनदास, ददलली, 1968.
6. बृहत्स णहता— वराहणमणहर णवरणचत, णहन्दी अनुवाद— बलदेव प्रसाद णमश्र, खेमराज श्रीकृ ष्णादास प्रकाशन, मुम्बई.
7. यजुवेद— णहन्दी अनुवाद सणहत, सातवलेकर, श्रीपाद दामोदर, पारडी
8. शुक्रनीणत — णहन्दी अनुवाद, ब्रह्मश कर णमश्र, चौखम्बा स स्कृ त सीरीज, वाराणसी, 968.
9. श्रीमिलमीदकरामायण — णहन्दी अनुवाद सणहत, (सम्पा०) जानकी नाथ शमाा, (1 —2 भाग) University Grants Commission (UGC) Page 77 of 141 PROPOSED UNDER GRADUATE COURSES FOR SANSKRIT (HON.) UNDER CHOICE BASED CREDIT SYSTEM (CBCS) Discipline Specific Elective (DSE) Course for Sanskrit गीताप्रेस, गोरखपुर.
10. ठाकु र, आघादत्त— वेदों में भारतीय स स्कृ णत, णहन्दी सणमणत, लखनऊ, 1967.
11. णतवारी, मोहन चन्द्र — अष्टाचक्रा अयोध्या इणतहास और परम्परा, उत्तरायण प्रकाशन, ददलली, 2006.
12. णवघाल कार, सत्यके तु — प्राचीन भारतीय शासनव्यवस्था और राजशास्त्र, सरस्वती सदन, मसूरी, 1968.
13. सहायक्वणशवस्वरूपक्व प्राचीन भारत का सामाणजक एव आर्मथक इणतहास, मोतीलाल बनारसीदास, ददलली, 2012
14. कौरटलीय अथाशास्त्र — णहन्दी अनुवाद — उदयवीर शास्त्री, मेहरचन्द्र लछमनदास, ददलली, 1968.
15. बृहत्स णहता— वराहणमणहर णवरणचत, णहन्दी अनुवाद— बलदेव प्रसाद णमश्र, खेमराज श्रीकृ ष्णादास प्रकाशन, मुम्बई.
16. यजुवेद— णहन्दी अनुवाद सणहत, सातवलेकर, श्रीपाद दामोदर, पारडी
17. शुक्रनीणत — णहन्दी अनुवाद, ब्रह्मश कर णमश्र, चौखम्बा स स्कृ त सीरीज, वाराणसी, 968.
18. श्रीमिलमीदकरामायण — णहन्दी अनुवाद सणहत, (सम्पा०) जानकी नाथ शमाा, (1 —2 भाग) गीताप्रेस, गोरखपुर.
19. ठाकु र, आघादत्त— वेदों में भारतीय स स्कृ णत, णहन्दी सणमणत, लखनऊ, 1967.
20. णतवारी, मोहन चन्द्र — अष्टाचक्रा अयोध्या इणतहास और परम्परा, उत्तरायण प्रकाशन, ददलली, 2006.
21. णवघाल कार, सत्यके तु — प्राचीन भारतीय शासनव्यवस्था और राजशास्त्र, सरस्वती सदन, मसूरी, 1968.
22. सहायक्वणशवस्वरूपक्व प्राचीन भारत का सामाणजक एव आर्मथक इणतहास, मोतीलाल बनारसीदास, ददलली, 2012
23. Bhandarkar, RG— Vaishnavism, Saivism and Minor Religious Systems, Indological Book House, Varanasi, 1965

Link:

[https://cbcs.skbuonline.in/syllabus\\_viewer/generate\\_syllabus\\_home.php?courseCode=SNS&syll=0&curr=1&hons=1&prog=0&degree=124#](https://cbcs.skbuonline.in/syllabus_viewer/generate_syllabus_home.php?courseCode=SNS&syll=0&curr=1&hons=1&prog=0&degree=124#)